June 11, 1963 J. A. THAYER 3,093,170

PORTABLE LOG DEBARKING MACHINE

Filed March 4, 1960 3 Sheets-Sheet 1

Fig. 1.

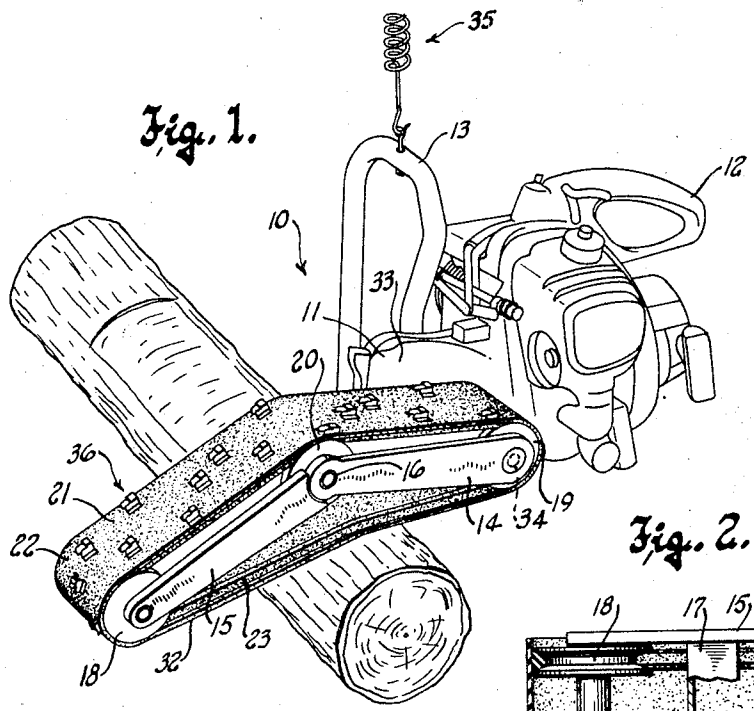


Fig. 2.

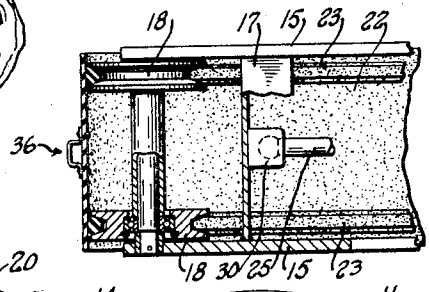
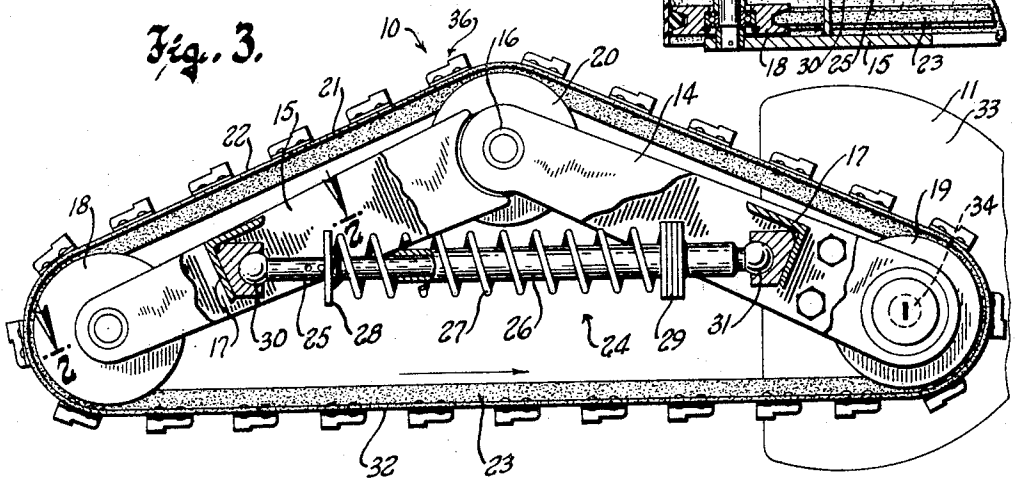


Fig. 3.



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June 11, 1963 J. A. THAYER 3,093,170

PORTABLE LOG DEBARKING MACHINE

Filed March 4, 1960 3 Sheets-Sheet 2

Fig. 4.

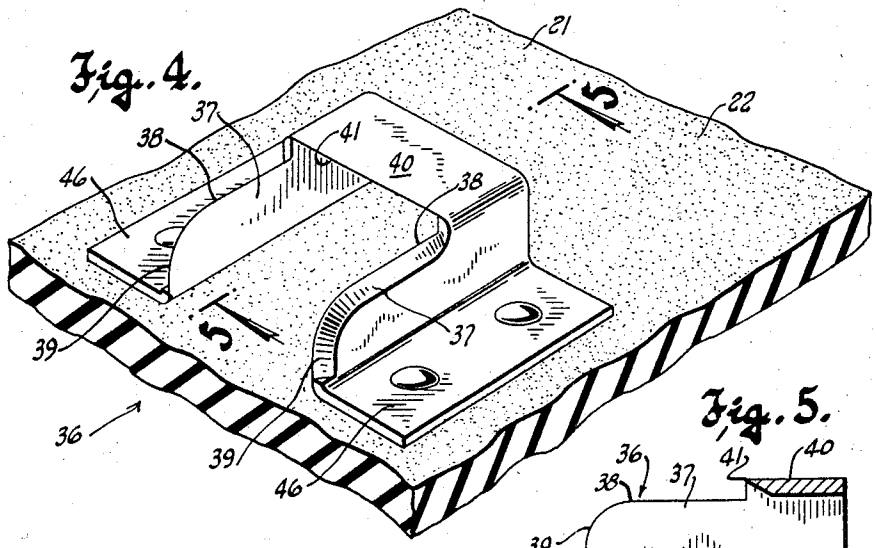


Fig. 5.

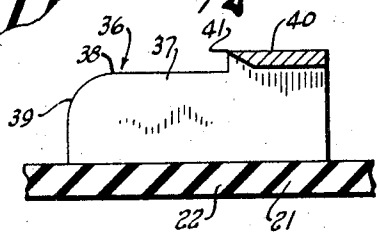


Fig. 6.

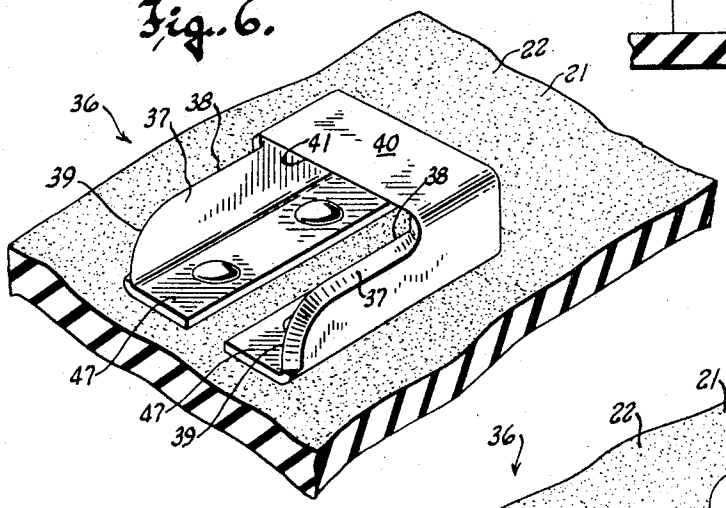
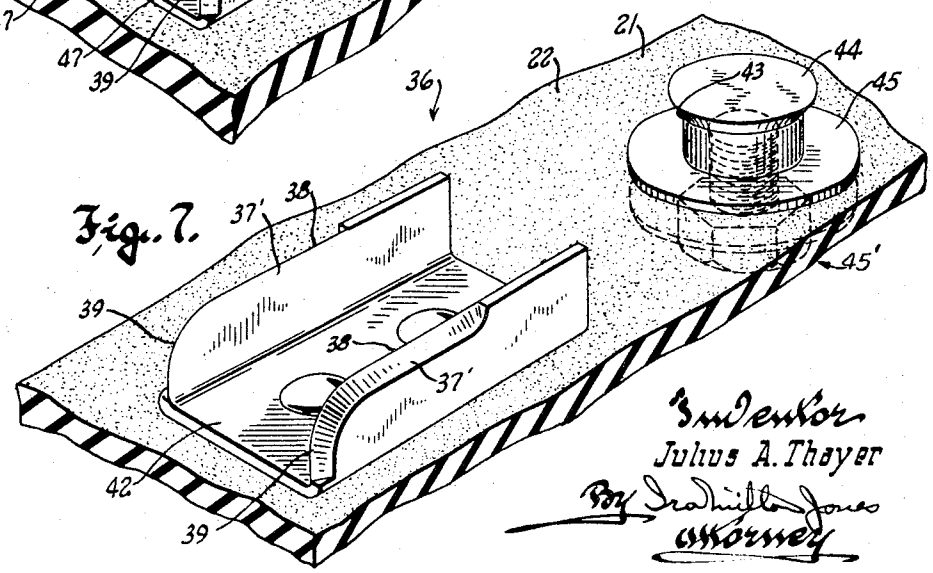


Fig. 7.



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June 11, 1963 J. A. THAYER 3,093,170

PORTABLE LOG DEBARKING MACHINE

Filed March 4, 1960 3 Sheets-Sheet 3

Fig. 8.

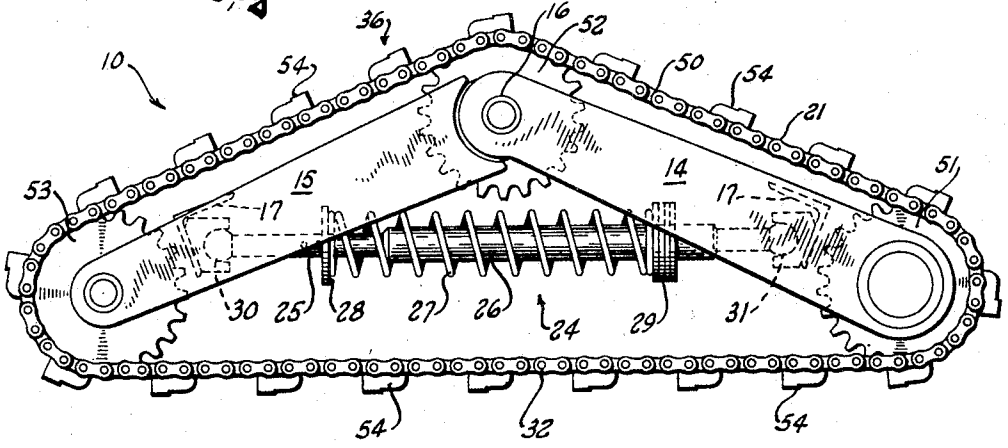
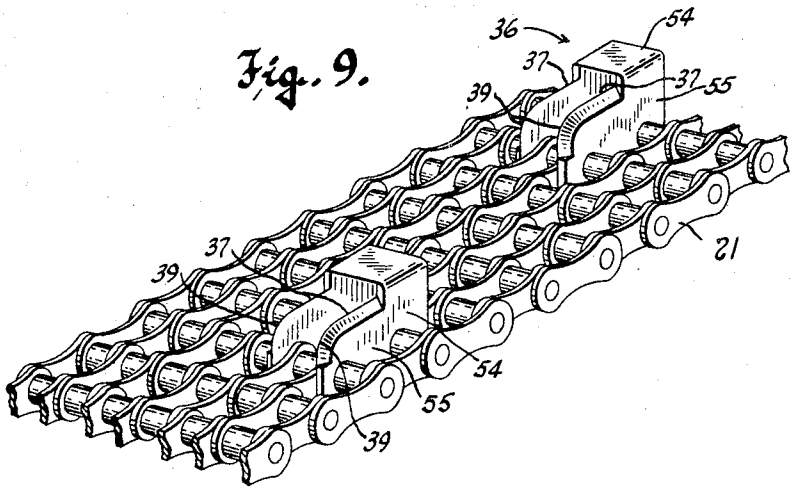


Fig. 9.



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United States Patent Office 3,093,170 Patented June 11, 1963

3,093,170

PORTABLE LOG DEBARKING MACHINE

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Filed Mar. 4, 1960, Ser. No. 12,757
9 Claims. (Cl. 144—208)

This invention relates to machines for removing bark from logs and refers more particularly to a readily portable debarking machine by which bark may be removed from logs in the field, that is, at or near the point where the trees are felled. Debarking is desirable in all cases, but logs intended for pulp wood and for telephone poles must have the bark removed; and it is logs of this size upon which the machine of this invention can be most successfully used. The economic advantage of debarking the logs out in the field rather than at the mill is self evident, but what is often not appreciated, is that for pulp wood the oily slick layer under the bark should be also removed.

In a broad sense, portable log debarking machines are not new. Several patents have been issued covering such machines and some of them, as for instance the machines of the Hastain Patent No. 2,676,628, and the Lantz Patent No. 2,708,468, are designed as attachments to the power head of a chain saw. This invention is also susceptible to embodiment as a chain saw attachment in the sense that it may be mounted on the power head of such a saw in place of the saw blade and chain, though, of course, it is not limited to this form.

For one reason or another, portable debarking machines heretofore available have not proved entirely satisfactory, and it is, therefore, the main object of this invention to provide an improved and more easily handled portable log debarking machine.

More specifically, it is the purpose of this invention to provide a portable log debarking machine which operates upon a new principle and hence is more effective in its cutting action, to the end that the debarking operation is performed more rapidly than has heretofore been possible, and, in addition, the oily slick cambium layer beneath the bark is removed.

A further object of this invention is to provide an improved cutter unit especially adapted for debarking purposes in that it acts to first isolate or define a relatively narrow ribbon on the surface being acted upon and then plows out that ribbon to a controlled or gaged depth, so that by advancing a plurality of these cutters arranged in side-by-side rows, a swath of reasonable width may be quickly cut across the surface of a log.

A still further object of this invention is to provide a cutting tool which, though well adapted for its specific purpose, i.e. as a portable log debarking machine, may be used with advantage in machines that are not necessarily portable and also for purposes quite remote from log debarking; and, in this connection, it should be noted that one of the features of the invention resides in the manner in which a plurality of individual cutters are collectively carried across the work being acted upon, to the end that relatively large areas thereof will be simultaneously acted upon despite the fact that the surface thereof is round or curved.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement

of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate several complete examples of the physical embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

FIGURE 1 is a perspective view of a portable log debarking machine embodying this invention and illustrating its manner of use;

FIGURE 2 is a detail sectional view taken generally on the plane of the line 2—2 in FIGURE 3;

FIGURE 3 is a side view of the main portion of the machine with parts broken away and in section;

FIGURE 4 is a detail perspective view of one of the cutting elements of the debarking machine;

FIGURE 5 is a detail sectional view through FIGURE 4 on the plane of the line 5—5;

FIGURE 6 is a perspective view similar to FIGURE 4, but illustrating a cutting element of slightly modified form;

FIGURE 7 is a perspective view illustrating still another modification of the cutting element;

FIGURE 8 is a view similar to FIGURE 3, of the main portion of the machine but equipped with a modified form of cutter carrier; and

FIGURE 9 is a fragmentary perspective view illustrating part of the cutter carrier of the machine shown in FIGURE 8.

Referring now to the accompanying drawings in which like numerals designate like parts throughout the several views, the numeral **10** designates generally the log debarking machine of this invention which, as shown in FIGURE 1, is adapted to be attached to the power head **11** of a conventional portable chain saw equipped with the customary engine and handles **12** and **13**.

The machine comprises essentially a pair of frames **14** and **15** hingedly connected, as at **16**. The structural formation of these frames is of no significance and, in the present case, each frame consists of two parallel side rails connected by cross members **17**. The fact that the frames are hingedly connected or articulated, however, is important.

At their outer ends, the frames **14** and **15** rotatably mount paired pulleys **18** and **19**, and at the hinged connection between the frames there is a third pair of pulleys **20**. The axes of all of these pulleys are parallel. Trained about these three pairs of pulleys is an endless flexible cutter carrier **21**. In that form of the invention shown in FIGURES 1–7, inclusive, the cutter carrier **21** is in the form of a belt **22** having a pair of parallel spaced V-belts **23** fixed to its underside. The V-belts reinforce the belt **22** and by tracking in grooves in the pulleys **18**, **19** and **20**, hold the cutter carrier against lateral shifting.

The length of the endless flexible cutter carrier is less than that required to allow the articulated frames **14** and **15** to be extended into endwise alignment, but it is long enough to enable them to assume an obtuse angle to one another, in which relative positions the frames are yield-

ingly maintained by a tension device, indicated generally by the numeral 24.

This tension device comprises a rod 25 slidably telescoped into a tube 26, and a coil spring 27 encircling the telescoped tube and rod and confined between abutments 28 and 29 respectively fixed to the rod and tube. The outer ends of the rod and tube have ball and socket connections 30 and 31 with the cross bars 17 of the frames 14 and 15 respectively. Hence, the tension device tends to spread the frames 14 and 15 apart and keeps the flexible cutter carrier taut with one stretch 32 thereof extending across the angle defined by the frames tangentially to the outer pulleys 18 and 19.

It is this stretch 32 of the cutter carrier which is engaged with the side of the log during the operation of the machine.

The machine, as indicated, is attached to the head 11 of a chain saw, as by having one of the rails of the frame 14 bolted or otherwise fixed to the face 33 of the gear housing to which the blade of the chain saw is normally fastened, and a suitable coupling means, not shown, drivingly connects the output shaft of the chain saw power head with the shaft 34 of the adjacent pair of pulleys 19.

In this manner the debarking machine may be said to become a part of the chain saw power head, which makes it possible to manipulate the machine in the same way that a chain saw would be handled and, if desired, the weight of the machine may be levitated by a conventional spring type suspension indicated by the numeral 35.

The specific shape and construction of the cutters, designated generally by the numeral 36, may be varied and modified to some extent, but to operate in the manner intended and with the desired effectiveness, the cutters should have spaced parallel knives 37 which project perpendicularly from the flexible carrier 21 in longitudinal alignment with the direction of its movement. The cutting edges 38 of the knives are straight and at the inner faces of the knives, being formed by grinding the outer edge portions of the blades. The leading ends of the blades are curved and also sharpened, as at 39, to merge gradually with the longitudinal knife edges 38.

In the cutters of FIGURES 4, 5 and 6, the knives 37 are the flanges or legs of a U-shaped stamping, the web or bight of which provides a chisel-like cutter blade 40. The edge 41 of the blade 40 extends straight across the space between the knives 37 and is formed at the top or outer face of the web or bight. Also, it is to be noted that the edge 41 is at a higher level than the edges 38, i.e. it is spaced farther from the flexible carrier 21.

As a result of the described location of the cutting edge 41 and the angle of the bevel which forms it, the chisel-like knife 40 plows itself into the surface of the log, but the knife blades 37 which precede the chisel-like blade 40 through the cut tend to act as feelers or gauges which regulate the depth to which the chisel-like blade enters the log.

In order that the machine may cut a swath of reasonable width, the cutters 36 are disposed in side-by-side rows, which collectively span substantially the entire width of the carrier belt 22, and to reduce the load on the driving means and assure smoother operation, the cutters are arranged in a staggered pattern, as shown in FIGURE 1. This disposition of the cutters makes the load on the driving means quite uniform.

Although preferable, it is not essential that the chisel-like blade be an integral part of the longitudinal parallel knives. It is only necessary that it follow in the wake of the knives, close enough to have the knives control the depth to which the chisel-like blade cuts. Thus, the arrangement shown in FIGURE 7 may be employed, wherein the parallel knives 37' form the flanges of a channel, as before, but in which the web 42 of the channel lies flat against the carrier belt.

The plow or chisel-like blade 43 in this case, is formed by the sharpened edge of a head 44 on a round stud provided with a rather large diameter flange 45 seated upon the belt. Both units, i.e. the blade unit and the plow unit, may be riveted to the belt, but if the plow unit is secured by a bolt and nut, as at 45', its cutting edge may be renewed by simply loosening the nut, rotating it and retightening.

The cutter elements shown in FIGURES 4, 5 and 6, are riveted to the carrier belt, the only difference between these two modifications being that, in one case, the attaching flanges 46 extend outwardly from the knives 37, and in the other the attaching flanges 47 project inwardly.

In using the machine, the stretch 32 of the cutter carrier is disposed transversely of the log or other work being acted upon, either at right angles thereto or obliquely, and then lowered into engagement therewith. By virtue of the yieldability of the tension device 24, and the hinge connected between the frames 14 and 15, the cutter carrier may wrap itself partially around the log, a condition which is brought about automatically by the weight of the machine. The active cutting zone is therefore relatively large despite its rather narrow width and the fact that the surface being acted upon is round or curved. It is understood, of course, that the cutter carrier travels at a fast lineal rate, on the order of 1,200 feet per minute.

Each individual cutter unit, therefore, has no difficulty defining and more or less loosening a ribbon of bark and then plowing it up. Because of the staggered arrangement of the cutters in side-by-side longitudinal rows, the cutters collectively and together cut a relatively wide swath across the log, and by continually turning the log and effecting relative movement between the machine and the log, endwise of the latter, all bark is quickly removed from the log.

An important feature of the invention resides in the fact that, with the cutters disposed and constructed as they are, it is not only the bark which is removed from the logs, but also the tough, oily, slick cambium layer directly beneath the bark. Hence, logs that have been debarked by the machine of this invention are better prepared, especially for pulp wood, since by the removal of the cambium layer all portions of the cut-up logs and chips formed therefrom will be "naked" and readily penetrable by the pulping solution.

However, the apparatus of this invention leaves the maximum amount of useful wood in the log. The knife portions 37 of each cutter tend to control the depth to which the chisel-like blade cuts, as mentioned above, and thus serve in effect, as depth gages or feelers which prevent the chisel-like blade portions from digging into the log more than, at most, a few thousandths of an inch below the cambium layer. This is because the knife edges tend to ride on the more fibrous solid wood beneath the cambium layer as soon as the latter has been removed, and normally they will not penetrate the wood to any substantial depth; consequently they prevent the chisel-like blade from digging into the solid wood.

As shown in FIGURES 8 and 9, the cutter carrier may be a chain link belt 50 trained about sprockets 51, 52 and 53, in which case the individual cutters 54 have their flanges 55 extended to form links of the belt. In all other respects, the modified embodiment of the invention shown in FIGURES 8 and 9 is the same as that previously described.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in this art that this invention provides a greatly improved portable debarking machine which makes the removal of bark from logs at the place where the logs are felled no more difficult than using an ordinary chain saw. It will also be apparent to those skilled in the art that since the machine removes not only the bark, but also the cambium layer directly under the bark, a log that has been prepared by use of the machine of this invention will make better pulp wood.

In addition, a log that has been debarked by the machine of this invention will make a better telephone pole, since the removal of its cambium layer facilitates the penetration of chemicals used for preservative purposes.

What is claimed as my invention is:

1. A machine for removing bark from logs comprising:

A. an endless flexible cutter carrier;

B. three rotatable members about which said cutter carrier is trained;

C. a frame supporting said rotatable members with their axes parallel,

(1) said frame holding two of the rotatable members in spaced apart relation so that they cooperate in defining a substantially long stretch of the carrier, and

(2) holding the third rotatable member with its axis spaced from the plane of the axes of said two designated rotatable members and at the side of the plane remote from said long stretch of the carrier, so that said third rotatable member defines two shorter stretches of the carrier and provides for substantial inward displacement of the medial portion of said long stretch of the carrier;

D. yielding biasing means on the frame translatingly urging two of said rotatable members relatively away from one another so that they at all times tend to hold said long stretch of the carrier straight and tend to resist such displacement thereof;

E. and a plurality of cutting elements secured to the cutter carrier at spaced intervals along the length thereof, each of said cutting elements comprising:

(1) a pair of thin knife blades projecting perpendicularly from the outer face of the cutter carrier, parallel to one another and to the direction of cutter carrier motion, said knife blades having their inner surfaces opposite one another and having

a. cutting edges which extended in the direction of cutter carrier motion so that the length of the knife blades is substantially greater than their height and

b. having curved and sharpened leading ends which merge with their cutting edges, and

(2) a chisel blade having

a. a cutting edge transverse to the cutting edges of the knife blades and between the planes of their inner surfaces, to plow material from between parallel cuts made by them,

b. said chisel blade being fixed with respect to the knife blades near their trailing ends so that the knife blades control the depth to which the chisel blade cuts.

2. The machine of claim 1, wherein each pair of thin knife blades comprises the flanges of a channel-shaped unit, the web of which is secured to the flexible cutter carrier; and further characterized by the fact that the chisel-like blade is separated from said channel and is fixed to the carrier at a distance behind the channel in the direction of carrier movement.

3. The machine of claim 1, further characterized by the fact that the flexible cutter carrier has a width greater than that of a single cutting element; and further characterized by the fact that the cutting elements are secured on the flexible cutter carrier in staggered arrangement, with the cutting elements disposed in side-by-side rows which collectively span the width of the carrier, but longitudinally spaced apart, so that relatively few cutters are in engagement with a piece of work at any one instant, but so that the machine cuts a swath of substantial width.

4. The machine of claim 1, further characterized by the fact that each pair of thin knife blades and its respective chisel-like blade are one integral U-shaped unit with the legs of the U forming the thin knife blades, and the bight of the U forming the chisel-like blade.

5. The machine of claim 4, further characterized by the fact that the bight of the U is flat, and has its cutting edge defined by having the inner face of the bight beveled along said edge so that the chisel-like blade digs itself into the material being cut.

6. The machine of claim 1, further characterized by the fact that the cutting edge of the transversely extending chisel blade is flush with the outer face thereof and the chisel blade has an inclined surface receding from its cutting edge, which surface causes the chisel blade to dig itself into material being cut to a depth permitted by the gaging effect of the parallel knife blades.

7. The machine of claim 1, further characterized by the face that the chisel blade comprises a stud having a circular cutting edge formed on its outer end, and means to mount the stud on the cutter carrier in any position of rotation.

8. A cutter element for a debarking machine of the character described, adapted to be carried by an endless flexible carrier which is power driven lengthwise in one direction, said cutter element comprising:

A. a pair of elongated knife blades, each having

(1) a cutting edge extending lengthwise thereof and

(2) a curved, sharpened leading edge portion that merges with its said cutting edge;

B. means holding said knife blades in parallel spaced apart relation and opposing one another so that upon longitudinal movement of the knife blades across a work piece they are capable of making a pair of parallel cuts;

C. and a sharp edged chisel blade extending transversely to said parallel knife blades, located between the planes of their opposing surfaces and spaced a substantial distance behind their curved leading edges so as to plow up the ribbon of material lying between cuts made by the cutting edges of the knife blades, said chisel blade being in fixed relation to the knife blades to have the depth of its cut controlled by the knife blades.

9. A log debarking machine having an endless flexible cutter carrier, mounting structure for the cutter carrier including spaced pulley means between which a stretch of the cutter carrier extends to partially wrap itself around a log when said pulley means are placed in juxtaposition to the log at opposite sides thereof, and drive means on the mounting structure drivingly connected with the cutter carrier to impart endwise movement thereto in one direction, the improvement which comprises:

A. a plurality of side-by-side rows of cutters on the outer face of the cutter carrier, with the cutters in adjacent rows staggered with respect to one another;

B. each of said cutters having knife blade means projecting perpendicularly from the outer face of the cutter carrier and elongated in the direction of cutter carrier motion, each of said knife blade means having

(1) an elongated cutting edge extending in the direction of cutter carrier motion and considerably longer than the distance said elongated cutting edge is spaced from the outer face of the cutter carrier; and

(2) another cutting edge at its leading end, part of which is substantially perpendicular to the outer face of the cutter carrier, and the remainder thereof being curved and merging with the elongated cutting edge;

C. the knife blade means of all of the cutters being parallel with one another and with the direction of cutter carrier motion, so that said knife blade means coact to slice the bark on the portion of the log about which the carrier is wrapped into adjacent ribbons; and

D. each of said cutters also having a chisel blade, the

cutting edges of said chisel blades being transverse to and extending to one side of the elongated cutting edges, in substantially parallel relation to the outer face of the cutter carrier at a distance therefrom slightly greater than the maximum distance said elongated knife edges are spaced from the outer face of the cutter carrier, so that the chisel blades plow the ribbons of bark from the log.

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